largest number of miners. At the same time it must be remembered that, as the miners are not spread uniformly over any of the counties, the actual density of the mining population can never be accurately shown on such a map.

The total value of the minerals raised in each county is approximately indicated on another coloured map; and there are also maps showing the output, according to counties, of coal, iron-ores, lead-ores, and zinc-ores. The statistical maps and diagrams, which add greatly to the value of the Report, have been prepared mainly, we believe, by Mr. J. B. Jordan, whose experience in dealing with mineral statistics has extended over nearly forty years.

Among the diagrams is one showing graphically the annual output of coal and the quantity exported from 1860 to 1894, whilst a similar diagram shows the iron ore raised and the quantity imported for the same period. The annual production of the ores of copper, lead, tin and zinc, during a like period of thirty-four years, is also illustrated by special diagrams. Perhaps the most interseting of all the diagrammatic schemes are those dealing with accidents in mines. These tabular returns, extending from 1851 to 1894, suggest very melancholy reflections, but still it is matter of satisfaction to note that, on the whole, the miner's lot has been ameliorated. Prof. Foster, referring to a table of death-rates, points out that "mining has immensely improved in safety during the last forty-four years. The mortality from accidents has dropped and goes on dropping. From time to time disastrous explosions have caused a temporary rise, but on the whole there is firm and steady progress in the right direction" (p. 36).

Some two or three years ago a great improvement was effected in the "Mineral Statistics" by the introduction of brief descriptive notices respecting the mode of occurrence of the several minerals referred to in the returns. It is understood that these remarks were from the pen of Prof. Foster, and he has very properly reproduced them in this Report. So far as they go, they are models of concise description; but it is to be hoped that opportunity may be found, in some future work, for their amplification, for at present they rather whet the appetite than afford it full satisfaction.

A comparison of the mineral industries of this country with those of other lands, forming Part vi. of the General Report, must have involved an immense amount of labour, inasmuch as it necessitated the collecting and collating of the mineral statistics of the world. The statistical returns are accompanied by valuable descriptive remarks on the resources of each country; and with such thoroughness has this part of the work been done, that Prof. Foster adds notes in connection with countries, like Arabia, Egypt and Turkey, whence little or no statistical information can be procured. There are necessarily many gaps in the foreign statistics; but steps have been taken to secure fuller returns in future, and the subsequent reports will probably be less imperfect. Prof. Foster has prepared a form, in English and French, asking for specific data, and copies of this form have been issued, through the Colonial and Foreign Offices, to Her Majesty's representatives abroad.

Notwithstanding the care bestowed upon the preparation of the Report, and the evident desire to bring its information up to date, it still necessarily falls short, in some respects, of an ideal report on our mineral industries. The information, for instance, respecting stone obtained from quarries is only meagre; but the Quarries Act of 1894 will enable us in future to have statutory returns from all open workings, more than twenty feet deep. If the aid of a staff of specialists could be secured, the descriptive part of the Report might be advantageously expanded, and a volume produced something like that on the Mineral Resources of the United States, issued annually by the Geological Survey, or like the admirable work started a few years ago in New York by Mr. Rothwell. Even, however, in its present form, Prof. Foster's Report presents us with a record of the mineral industries of our country, far more comprehensive, instructive and accurate than anything which the British miner has hitherto possessed.

OUR BOOK SHELF.

Leerboek der Organische Chemie. By Dr. A. F. Holleman. (Groningen: J. B. Wolters, 1896.)

THE author in his preface says that text-books of organic chemistry, used in Holland by students of medicine and pharmacy and by candidates in the faculty of science, contain too much and too little—too many facts and too little theory.

There is no doubt that this criticism of our larger organic text-books is a fair one. Volumes like those of Richter and Bernthsen are distended with an unnecessary number of compounds, whilst they conceal within an occasional paragraph of small print important questions of theory; they are books for reference rather than for study. In the present case the author wisely attempts to minimise the number of compounds, and boldly discusses in full-sized type points of theoretical interest as they present themselves. The influence of the Amsterdam school of chemistry is very apparent in this.

We find accounts of geometrical isomerism, including Hantzsch and Bamberger's latest views on the constitution of diazo-compounds, of the relation between osmotic pressure and the freezing and boiling point of solutions, of Arrhenius' electrolytic dissociation theory and its application to the determination of the strength of acids, of the thermodynamic law, which underlies the conversion of racemates into tartrates, &c., all clearly and concisely given.

There can be little objection to physical-chemical theories entering into the composition of an organic text-book; they are interesting and suggestive. But the author has unfortunately fallen into the error of neglecting the practical side of the subject, of too frequently ignoring the laboratory and the works, of omitting experimental details of important preparations, and of presenting to the student chemical reactions as a series of ingeniously contrived equations.

We do not know, of course, for what type of student the book is intended; but it would be out of the question to put it into the hands of a beginner, or of one who had had no previous training in practical organic chemistry.

J. B. COHEN.

Physics for Students of Medicine. By Alfred Daniell, M.A., LL.B., D.Sc., F.R.S.E. Pp. 469. (London: Macmillan and Co., Ltd., 1896.)

DR. DANIELL'S "Principles of Physics" is known to be an excellent systematic treatise on physical science, setting forth fundamental principles in a sound and scientific way. In the volume now under notice the same orderly arrangement is followed as in its larger

© 1896 Nature Publishing Group

forerunner, the result being that the book provides a good general preparatory course, which will give students of medicine a broad and satisfactory view of the principles of physics, and will equip them with very serviceable knowledge. Intended primarily to meet the new regulations of the General Medical Council (which make physics a part of the extended course of professional study), the book contains numerous examples of the application of physical principles to medical science, relating both to instruments and muscular actions. But though medical students will find special interest in some of the examples used to illustrate the subjects described, the information given can readily be understood by all who read with studious mind. Therefore we commend Dr. Daniell's volume to teachers of physics generally, believing that they will find it worthy of adoption. The contents include chapters on units of measurement, motion of bodies, friction, matter, sound, heat, ether-waves, and electricity. All these subjects are treated as thoroughly as is possible in a book of this character.

Physics cannot be learned; it must be experienced. Dr. Daniell recognises this, and points out that his work "is not designed to supersede, but rather to clear the ground for practical teaching and demonstration." It is to be hoped that this practical work will some day form a part of the professional curriculum.

Physical Units. By Magnus Maclean, M.A., D.Sc., F.R.S.E. Pp. 147. (London: Biggs and Co., 1896.)

IT can safely be said that this book will find its way into every laboratory where physical facts are investigated. The tables of results brought together in the volume will be most useful for reference; and as they represent determinations made by foremost workers, trust can be put in them. Additional value is given to the tables by the fact that references are made in most cases to the books and papers from which the data have been obtained.

Two-thirds of the book are devoted to the discussion of physical units and the relations between them, the remaining third being taken up with the tables already mentioned. Students of physics will obtain from the text clear and sound knowledge of their units of measurement, and to more advanced investigators the book will prove a veritable vade-mecum.

Elements of the Theory of Functions. By Dr. H. Durège. Translated by George Egbert Fischer and Isaac J. Schwatt. Pp. 288. (Philadelphia, 1896.)

THE late Prof. Durège's treatise, in this English translation, will be a welcome addition to the works on this subject by Forsyth and Harkness and Morley. Durège has a genial method of exposition, as all who know his other book on Elliptic Functions will testify. The numerous definitions and novel ideas in the "Theory of Functions" are made clear by well-chosen illustrations and diagrams. There is no reference to the date of the first edition, but we believe it goes back some thirty years; so that Durège could claim to be a pioneer in the presentation of this subject to the general reader, Weierstrass's ideas being inaccessible to all except his own university pupils. G.

Charles Darwin and his Theory. By M. A. Antonovich. Pp. 353, with a portrait. (Russian.) (St. Petersburg, 1896.)

THIS is a very good summary of the chief works of Darwin, in which his scientific views are intimately interwoven with personal details of his life, in so far as they are known from Francis Darwin's "Life and Letters," and partly from Krause's "Charles Darwin," the whole being written with a deep admiration of both Darwin's personal qualities and his philosophy.

LETTERS TO THE EDITOR.

[*The Editor does not hold himself responsible for opinions expressed by his correspondents Neither can he undertake to return, or to correspond with the writers of, rejected manuscripts intended for this or any other part of* NATURE. *No notice is taken of anonymous communications.*]

A Query concerning the Origin of Atolls.

HAVING recently visited and studied in some detail the coral mass of the Bermuda Islands, I have been impressed by one thing more than by anything else, namely, the fact so long known that the islands owe their present elevation almost exclusively to the action of the wind. The hills, which often rise to a height of 200-250 feet above the sea, from near their base to their summit, are made of blown coral sand, now consolidated into a more or less compact rock.

A recent subsidence has carried most of the islands below the sea level, leaving only the more elevated southern part above, because this had been built higher than the rest by the strong southern winds. This subsidence has been so recent that the heavy south waves are still battering at the cliff; and the débris thus obtained, added to that furnished by the abundant coral growth of the reef which lies immediately off shore, has not yet been able to build extensive beaches. Here and there we find beaches, usually small ones, and from these the sand is even now marching inland and adding to the height of the land, illustrating the process by which the islands have been reared to their present height. Nevertheless, although in a few places the importance of the wind action is still illustrated, it is practically at an end, and that because of a recent subsidence of certainly 50 feet and probably less than 100 feet.

On the basis of these facts I wish to propound a query which has arisen in my mind, but which I would not assume to answer on the basis of a study of only one coral island. Granting an atoll ring formed in the mid-ocean in the way which the theory supported by Dr. Murray and others demands, would we not of necessity have first a ring of reef or beach rock, then of coral sand which with age continued to rise in elevation until the Bermuda stage was reached? For various reasons a luxuriant vegetation would not at first serve to check this. A constant supply of sand is furnished by the life which skirts the shore, the waves are present to drive it on the shore, and the wind to heap it up.

Given this tendency and islands either standing at a uniform level, or being elevated, there should, it would seem, be all gradations between the atoll ring and the insular mass of wind-blown sand not unlike the Bermudas. If, however, the older theory advocated by Darwin and by Dana were correct, there would not need to be such a condition, for subsidence would counteract the action of waves and winds, and the ring condition of the low atoll could easily be the type condition.

Cornell University, Ithaca, N. Y. RALPH S. TARR.

"The Primary Factors of Organic Evolution."

IN a review of Prof. Cope's "Primary Factors of Organic Evolution" (NATURE, vol. liii. p. 553), Dr. Alfred R. Wallace denounces its "extraordinary statements," its "misstatements," and its "absurd arguments," and finds it refreshing to turn to the original ideas and acute reasoning of another book. The fact that the first book is by an opponent and the second by a follower of the reviewer, perhaps accounts for, though it does not justify, opinions that depart widely from what will be the judgment of the most competent. A work of unusual originality such as Prof. Cope's, is apt to contain much that is open to criticism; but it is no small matter to have brought together, as he has done, the evidence in favour of finding in the environment, in the movements of animals and in consciousness, the efficient factors of organic evolution. The present writer finds the arguments inconclusive, but he does not understand how any one can read the book without admiring the intimate knowledge of facts and the great powers of generalisation which it discloses. Dr. Wallace states that it is "absolutely untrue" that "the variation which has resulted in evolution has not been multifarious or promiscuous, but in definite directions," yet the evidence offered for this proposition—due perhaps more to Prof. Cope than to any other—has within the past few months proved convincing even to Prof. Weismann. Prof. Cope's book and his work should be adequately described and seriously criticised; but Dr. Wallace has done neither. J. MCKEEN CATTELL.

Columbia University, New York, May 9.

© 1896 Nature Publishing Group